

**ORIGINAL RESEARCH**

# Assessment of association between increased neutrophil lymphocyte ratio and erythrocyte sedimentation rate in patients with *Helicobacter pylori* positive chronic gastritis

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**ABSTRACT**

**Background:** *Helicobacter pylori* (*H. pylori*) is a type of bacteria that can infect the stomach and the upper part of the small intestine. The present study was conducted to assess association between increased neutrophil lymphocyte ratio and erythrocyte sedimentation rate in patients with *Helicobacter pylori* positive chronic gastritis. **Materials & Methods:** 58 patients with *H. pylori* infection of both genders were kept in group II and healthy subjects in group I. Patients with positive HP were subdivided in two groups of 29 each according to gastritis staging. 5 ml venous blood samples obtained in the morning after 8-hours fasting and the measurement of NLR and ESR levels were performed. **Results:** In group I, males were 29 and females were 29 and in group II, males were 30 and females were 28. In group I and group II, mean hemoglobin level was 13.1 g/dl and 12.8 g/dl, platelet count ( $\times 1,000$ ) was 292.5 and 278.4, WBC was 8524.2 and 9462.3, neutrophil count was 6542.8 and 8024.6, lymphocyte count was 2304.2 and 1425.6 and NLR was 2.84 and 5.34 respectively. ESR was 20.4 mm/hour in group I and 36.2 mm/hour in group II. The difference was significant ( $P < 0.05$ ). The mean NLR in asymptomatic gastritis group was 5.28 and in symptomatic gastritis group was 6.94. The difference was significant ( $P < 0.05$ ). **Conclusion:** There is an increase in NLR as the severity of gastritis with HP increases. NLR is the strongest markers of inflammatory condition.

**Key words:** *Helicobacter pylori*, NLR, gastritis

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**INTRODUCTION**

*Helicobacter pylori* (*H. pylori*) is a type of bacteria that can infect the stomach and the upper part of the small intestine. It is a common bacterial infection that is often acquired in childhood and can persist throughout a person's life if not treated. *H. pylori* infection is a major cause of various gastrointestinal conditions.<sup>1</sup> *H. pylori* infection is a leading cause of chronic gastritis, which is the inflammation of the stomach lining. Gastritis can lead to symptoms such as stomach pain, bloating, nausea, and vomiting. *H. pylori* infection is strongly associated with the development of peptic ulcers, which are open sores

that can form on the lining of the stomach or the duodenum (the first part of the small intestine). These ulcers can cause abdominal pain, indigestion, and in severe cases, bleeding and perforation.<sup>2</sup>

Person-to-person transmission of HP through either fecal/oral or oral/oral exposure seems most likely.<sup>3</sup> Diagnostic testing for HP can be divided into invasive and non-invasive techniques based upon the need for endoscopy. Few investigations have found a link between inflammatory mediators and the occurrence of HP infection. C-reactive protein (CRP) levels, in particular, were found to be elevated in HP. During an inflammatory reaction, leukocytes become activated.<sup>4</sup>

Leukocytes have been found to play a role in a variety of chronic diseases, including diabetes, hypertension, atherogenesis, thrombus formation, and other inflammatory disorders. In addition to a high quantity of leukocytes, there is a link between the neutrophil/lymphocyte ratio (NLR) and the severity and prognosis of cardiovascular disease (CVD).<sup>5</sup> The present study was conducted to assess association between increased neutrophil lymphocyte ratio and erythrocyte sedimentation rate in patients with *Helicobacter pylori* positive chronic gastritis.

## MATERIALS & METHODS

The present study consisted of 58 patients with *H. pylori* infection of both genders visiting department of medicine Grmc Gwalior (mp). All gave their written consent to participate in the study. HP was diagnosed according to the National Institutes of Health (NIH) in 1994.

Data such as name, age, gender etc. was recorded. Healthy subjects were kept in group I and patients with *H. pylori* infection were kept in group II. Patients with positive HP were subdivided in two groups of 29 each according to gastritis staging on the basis of OLGA proposal and clinical symptoms, the group with non-atrophic gastritis stage I–II were asymptomatic. The second symptomatic group (epigastric pain, nausea, and vomiting) and positive HP have atrophic antral gastritis 80% and 20% antral and corpus gastritis stage III–IV. 5 ml venous blood samples obtained in the morning after 8-hours fasting and the measurement of plasma glucose, urea, creatinine, total cholesterol, TG, HDL, and LDL levels were performed. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

## RESULTS

**Table I Distribution of patients**

Groups	Group I	Group II
Status	Control	HP positive
M:F	29:29	30:28

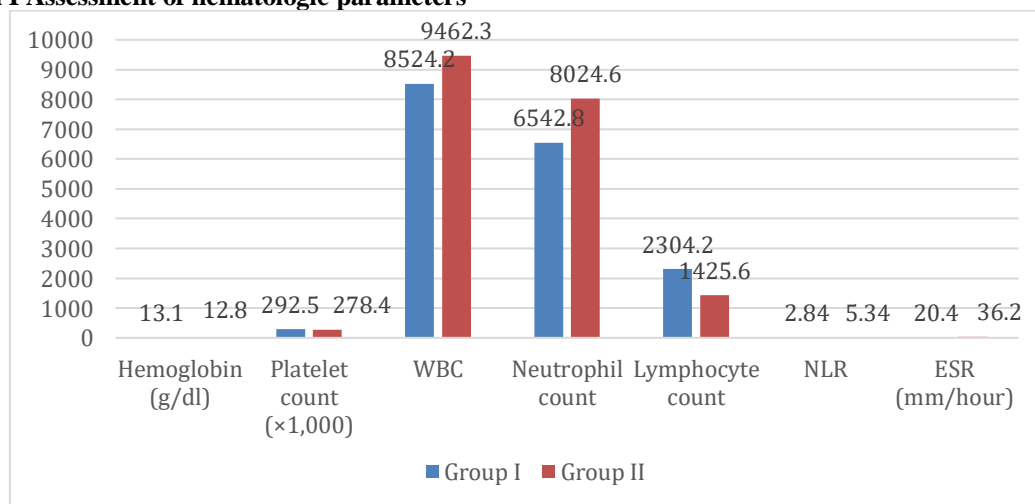
Table I shows that in group I, males were 29 and females were 29 and in group II, males were 30 and females were 28.

**Table II Assessment of hematologic parameters**

Parameters	Group I	Group II	P value
Hemoglobin (g/dl)	13.1	12.8	0.84
Platelet count (×1,000)	292.5	278.4	0.16
WBC	8524.2	9462.3	0.05
Neutrophil count	6542.8	8024.6	0.04
Lymphocyte count	2304.2	1425.6	0.02
NLR	2.84	5.34	0.01
ESR (mm/hour)	20.4	36.2	0.01

Table II, graph I shows that in group I and group II, mean hemoglobin level was 13.1 g/dl and 12.8 g/dl, platelet count (×1,000) was 292.5 and 278.4, WBC was 8524.2 and 9462.3, neutrophil count was 6542.8 and 8024.6, lymphocyte count was 2304.2 and 1425.6 and NLR was 2.84 and 5.34 respectively. ESR was 20.4 mm at the end of 1 hour in group I and 36.2 mm at the end of 1 hour in group II. The difference was significant (P< 0.05).

**Graph I Assessment of hematologic parameters**



**Table III NLR in asymptomatic and symptomatic gastritis**

Groups	NLR	P value
Asymptomatic gastritis (stage I- II)	5.28	0.02
Symptomatic gastritis (stage III- IV)	6.94	

Table III shows that mean NLR in asymptomatic gastritis group was 5.28 and in symptomatic gastritis group was 6.94. The difference was significant ( $P < 0.05$ ).

## DISCUSSION

One of the most frequent chronic bacterial infections in humans is *Helicobacter pylori* (*H. pylori*). It affects approximately half of the world's population.<sup>6,7</sup> In general, the infection is seen more commonly and acquired earlier in developing countries than in developed ones due to a variety of factors such as geographical location, ethnic characteristics, sanitation conditions, and the country's economic structure. Dyspepsia is a combination of symptoms with a diverse pathogenesis and differential diagnosis.<sup>8</sup> It affects at least 20% of the population. While 25% of patients with dyspepsia symptoms have an underlying organic cause (organic dyspepsia), 75% have no underlying organic cause in diagnostic examination (functional dyspepsia). There is a link between the neutrophil/lymphocyte ratio (NLR) and cardiovascular disease (CVD) severity and prognosis.<sup>9,10</sup> The present study was conducted to assess association between increased neutrophil lymphocyte ratio and erythrocyte sedimentation rate in patients with *Helicobacter pylori* positive chronic gastritis.

We found that group I, males were 29 and females were 29 and in group II, males were 30 and females were 28. Farah et al<sup>11</sup> investigated the relationship between the presence of gastritis due to HP infection and neutrophil/lymphocyte ratio (NLR). Fifty patients met the HP criteria and half of them have had severe symptoms and upper endoscopy showed atrophic gastritis, and fifty age- and sex-matched control subjects with gastritis without HP infection were included in this randomized controlled trial. Patients were diagnosed to have HP according to the use of urea breath testing (UBT) and multiple biopsies. NLR was calculated from complete blood count at the time of diagnosis and before initiating the treatment to all groups.: Patients with HP infection had significantly higher NLR compared to those without HP. Moreover, the patients with symptomatic HP and grade 4 gastritis had higher NLR than those asymptomatic with past history of peptic disease. Although NLR increased as the severity of gastritis and HP symptoms increased ( $r = 0.564$ ,  $P < 0.001$ ), Receiver operating characteristic (ROC) Curve analysis was performed. The cut-off level for NLR with optimal sensitivity and specificity was calculated as 1.82 (area under curve [AUC] = 0.825 [0.753–0.884],  $P < 0.001$ ).

We found that in group I and group II, mean hemoglobin level was 13.1 g/dl and 12.8 g/dl, platelet count ( $\times 1,000$ ) was 292.5 and 278.4, WBC was 8524.2 and 9462.3, neutrophil count was 6542.8 and

8024.6, lymphocyte count was 2304.2 and 1425.6 and NLR was 2846.2 and 5342.6 respectively. ESR was 20.4 mm/hour in group I and 36.2 mm/hour in group II. Boyuk et al<sup>12</sup> investigated the relationship between *H. Pylori* infection and hematimetric indices in patients with dyspepsia symptoms. Overall, 448 patients who underwent gastroscopy were analyzed retrospectively. Histopathological evaluation of biopsies according to *H. pylori* presence was classified as *H. Pylori* positive and negative groups, which are analyzed in relation with hematimetric indices. NLR and platelet-lymphocyte ratio (PLR) measurements did not show a statistically significant difference between *H. pylori* negative and positive groups ( $p > 0.05$ ). NLR revealed a negative correlation between hemoglobin (HGB), iron, and ferritin measurements in the correlation analysis of the *H. Pylori* positive group ( $r = -0.133$ ,  $p = 0.031$ ;  $r = -0.270$ ,  $p = 0.002$ ;  $r = -0.162$ ,  $p = 0.032$ ). Again, with PLR, there was a negative correlation between HGB, mean corpuscular volume (MCV), iron, and ferritin measurements ( $r = -0.310$ ,  $p = 0.001$ ,  $r = -0.187$ ,  $p = 0.002$ ,  $r = -0.335$ ,  $p = 0.001$ ;  $r = -0.290$ ,  $p = 0.001$ ).

The limitation of our study is small sample size.

## CONCLUSION

Authors found that there is an increase in NLR as the severity of gastritis with HP increases. NLR is the strongest markers of inflammatory condition.

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